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2. AN INSTANCE OF ADOPTION IN THE INDIAN FLYING FOX *PTEROPUS GIGANTEUS* (CHIROPTERA: PTEROPODIDAE)

Parental care among mammals is complex and species specific. Diverse forms of parental care have arisen among mammals, primarily determined by the precocity of the young. In practically all mammals, mothers accept only their own young for suckling and parental care. A major downside of parenting is that when an animal cares for young, it must forgo some other activities such as searching for food or mates (Alock 1998). The males of primates such as *Presbytis entellus* (McCann 1934) and *Presbytis aristalus* (Bernstein 1968) respond to individual infants in distress. Among bats, McCann (1940) reported an instance in *Rousettus leschenaulti*, where a young one had deserted the body of its dead mother and gone to another which already had a suckling young one.

Mother-infant contact in some species is intense and uninterrupted throughout the early period (Simonds 1965). In bats, during the first few days of life, the young would be carried during foraging flight (Griffin 1940). Mortality among bats is highest between the onset of independent flight and the end of the first year of life (Brosset 1962, Davis 1966). Social organisation serves to minimize this mortality (Bradbury 1977).

Communal raising of young is exhibited by some bats (Bradbury 1977). Two to ten adult females are found to take care of the young in the nursery roost at all times (O'Farrell and Studier 1973). Gopalakrishna and Badwaik (1993) reported that lactating females of *Miniopterus schreibersii fuliginosus* and *Rhinolophus rouxi* visit the groups of young left behind periodically, and suckle them on a community feeding basis. However, in *Hipposideros speoris*, mother and young recognise each other, and the mother suckles only her baby (Gopalakrishna and Badwaik 1993). Females of several other bats also specifically identify young (Kulzer 1958; Nelson 1965; Pearson *et al.* 1952, Davis *et al.* 1968). Incidence of adoption has been reported in some primates (Itani 1959, Rowell 1963). However, instances of adoption have rarely been observed among bats, though community raising and community suckling have been reported.

Since 1995, the authors have been regularly observing the feeding, roosting and breeding biology of *Pteropus*

giganteus in south Kerala. During April 2000, a female bat with her attached young (B₁), was recovered along with another young (B₂), whose mother died soon. B₂, the orphan, was smaller although born during the same season. The bats thus recovered were housed in a netted cage (1.5 x 1 x 1 m) for observation. Initially the mother bat, with her attached young, hung on one corner of the cage, while the orphaned young hung at the opposite corner, vocalising continuously. The expectation was that the female bat would be antagonistic to the orphan because it had a baby of its own. As the orphan was in early infancy, an attempt to hand feed it was unsuccessful. Surprisingly, the following morning the mother bat was nursing both the young ones – one attached to each nipple (Fig. 1). In fact, the mother bat had moved with its attached young one to the corner where the orphan was hanging.

Since then, the two young bats remained attached to the female, exchanging nipples occasionally. After a week, the bats were left free in a larger netted shelter (8 x 5 x 3 m), where they could move freely and even fly. At dusk, fruits like banana, papaya and cashew were provided with water *ad libitum*. In the morning, both the young ones were closely wrapped by the mother bat, probably a mechanism for thermoregulation, while at night she left them and went to the food tray. This is reflective of the wild, where mother bats leave young ones at nursery sites while foraging. Occasionally she carried the young ones during the night. By the end of April, they moved independently at night and started eating or at least biting at fruits.

In May, two more young female bats could be recovered from the same roost, they were found attached to small plants below the roost. These young ones (B₃ and B₄) could also have been born during the same season as B₁ and B₂. B₄ was larger than B₃ and the two were introduced into the bat shelter.

Initially, B₃ and B₄ remained away from the others (Fig. 2). At night all the young bats, except B₂, carried fruits from the food tray to different locations and fed independently, a foraging pattern exhibited in the wild where individuals carry fruit for consumption away from the group foraging tree. B₂, which was

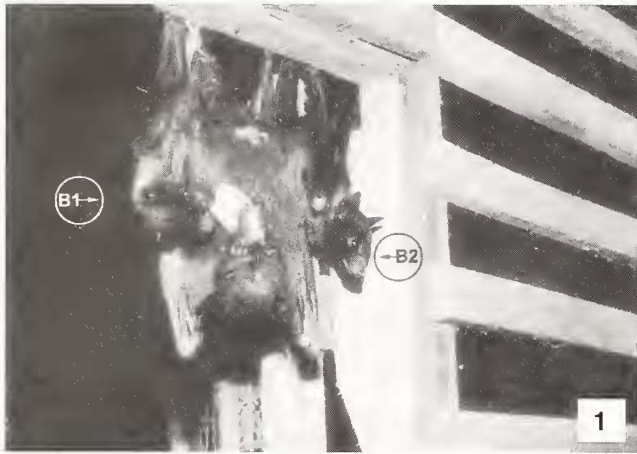


Fig. 1: B1 the original young, and B2 the orphaned young remaining attached to the mother bat



Fig. 3: B4 approaching foster mother bat and dislodges B2 to get itself adopted



Fig. 2: B3 and B4, the orphans collected later, hanging separately, while B1 and B2 remain attached to the mother bat



Fig. 4: All three young B1, B2 and B4 taking turns to feed as B3 remains independent

too small, was still carried by the foster mother during the 'foraging trips'. Subsequently, B₃ and B₄ started 'roosting' close to the other captive bats during the day. Towards the end of May, B₄ was seen hanging close to its foster mother bat and licking her wings and neck, after which it started feeding from her nipple, displacing B₂ (Fig. 3). Subsequently all the three young ones (B₁, B₂ and B₄) were found covered by the mother bat's outstretched wings. Evidently, B₄ was also accepted by the foster mother. The three young ones took turns to feed, as only two could feed at a time, and this relationship continued. B₃ remained independent (Fig. 4).

The reason for B₄ being adopted, while B₃ was not, cannot be explained. Possibly B₃ did not approach the foster mother, hence she did not respond. Neither did B₃ vocalise like B₂. In the earlier instance, the foster mother moved towards B₂, quite probably in response to repeated vocalization. In the subsequent instance, unlike B₂, B₄ approached the foster mother. Both the behavioural interactions resulted in adoption.

From July, the mother bat ceased to lactate and started

tightly folding her wings around her body to prevent the young ones from suckling, but they continued sucking the nipple. This could be the weaning stage. Such signs of alienation are observable in the field also, when nursing mothers refused to feed during the same period and adult males started chasing attached young ones from their mothers.

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3. NEW SITE RECORD FOR SMALL TRAVANCORE FLYING SQUIRREL *PETINOMYS FUSCOCAPILLUS FUSCOCAPILLUS* FROM KARNATAKA

As part of a mammalian study, we surveyed the forests of Brahmagiri-Makut during November 2001 and January 2002. The forests of Brahmagiri-Makut lie between 12° 5'-12° 13' N and 75° 50'-76° 3' E, and form the southern tip of the Western Ghats in Karnataka, in the district of Kodagu. Elevation varies from 60 m above msl to 1,650 m above msl. The area receives both southwest and northeast monsoon and the average annual rainfall is about 6,000 mm. The region includes three forest ranges, namely Srimangala, Makut (Wildlife) and Makut (Reserve Forest). Srimangala and Makut (Wildlife) are a part of the Brahmagiri Wildlife Sanctuary.

We walked 54 km during nights with about 21 'spotlight hours'. A total of five (0.19 animals/spot-hour) Small Travancore Flying Squirrels were sighted in the western slopes of the Makut (Wildlife) and Makut (Reserve Forest) ranges. No animal was sighted in the Srimangala range, adjacent to Makut. The animals were located up to 200 m above msl. Local people were also interviewed for more information on the species. Local people from the western side of these hills in the adjoining state of Kerala reported having sighted this species in their coconut and cashew nut gardens. Since this species raids cashew gardens during the crop season to feed on cashew kernel, it is hunted by the locals, who also eat its meat.

Two species of flying squirrels are described from Peninsular India (Prater 1993): the Small Travancore Flying Squirrel *Petinomys fuscocapillus fuscocapillus* and the Large Brown Flying Squirrel (*Petaurista philippensis*). The Large

Brown Flying Squirrel occurs throughout Peninsular India, whereas the Small Travancore Flying Squirrel is believed to be restricted to some parts of the Western Ghats. Kurup (1989) rediscovered the Small Travancore Flying Squirrel in coconut groves in coastal Kerala, after a gap of 70 years. Ashraf *et al.* (1993) conducted a survey of flying squirrels in the Indira Gandhi Wildlife Sanctuary in Tamil Nadu and Kudremukh National Park in Karnataka. The Small Travancore Flying Squirrel was recorded only from the Indira Gandhi Wildlife Sanctuary. We have also surveyed the rainforests of Sirsi-Honnava region north of Sharavati river, and found that the species was absent. The ex-hunters and active hunters also reported that the species was never sighted in the region. Therefore, the sighting of this species in Brahmagiri-Makut is the first report from the forests of Karnataka.

It may be seen from the available literature that this species has only been sighted from three locations so far. To understand its current distribution and status, further surveys are required along the coastal forests and western slopes of the Western Ghats.

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